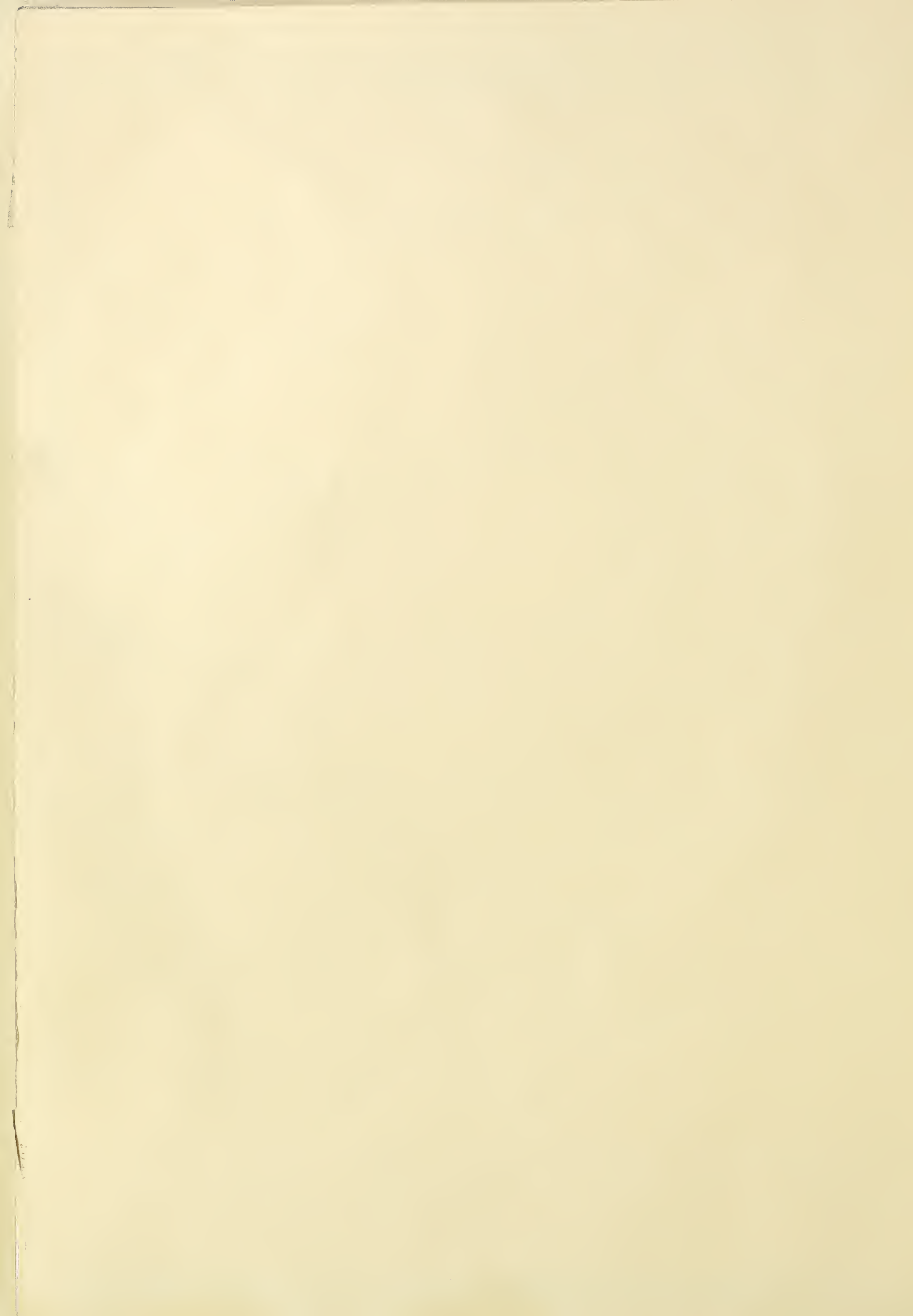


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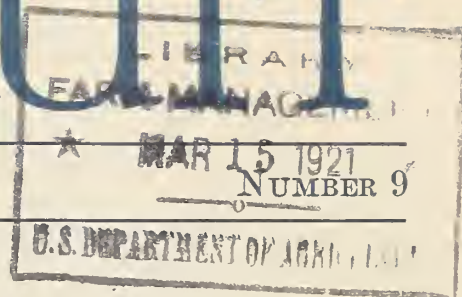


BETTER FRUIT

VOLUME XV

MARCH, 1921

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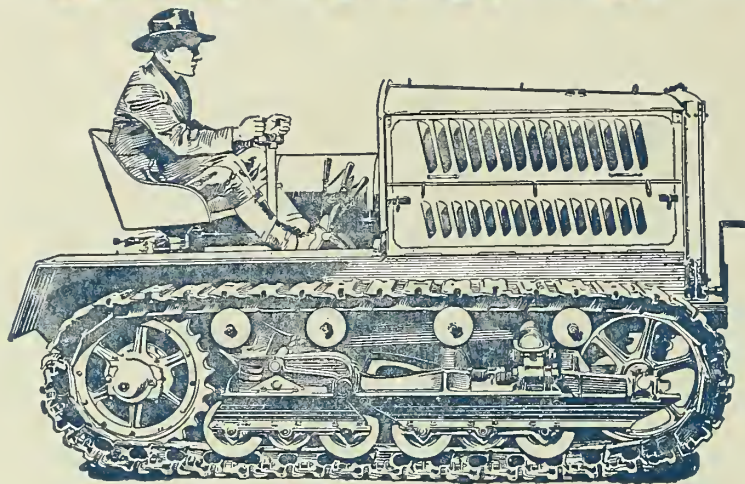
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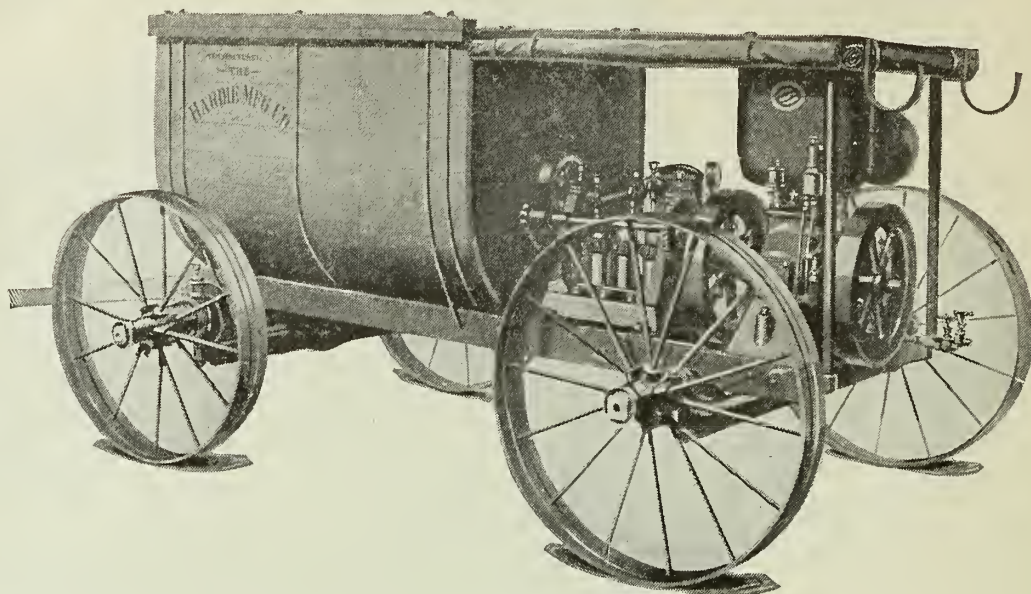
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Cherry Insects and Their Control

By A. L. Lovett, Entomologist, Oregon Experiment Station

OF THE insects which attack the cherry, there are none of such outstanding importance as to be generally recognized or as to prevent the development of a fair crop of fruit from year to year. As a rule, cherry growers practice no definite spray program for insect pest control. Nevertheless there are a number of fairly serious pests that prey upon cherries. Occasionally sprays must be applied for their control or serious losses result. It is a reasonable conclusion that the adoption of a more comprehensive spray program would be most decidedly profitable for the majority of the growers.

The Cherry Maggot.

The fruit of our late varieties of cherries, when ripe, if permitted to remain on the trees for a short time, or where held in storage often develop an inconspicuous shrunken brown area on one side. An examination of the interior of the fruit reveals a plump white maggot within the decaying pulp, usually located near the pit. This maggot is the larva of the cherry fruit fly or the cherry maggot.

Seasonal Injury.

The cherry fruit maggot passes nearly ten months of its existence in the soil as an inconspicuous brown, capsule-like puparium. The adult fly emerges from the soil about the time the cherries begin to show color (June 5 to 20.) They are rather small, light brownish flies with conspicuous black bars across the wings. They "sport" about on the foliage of the trees for about ten days lapping up droplets of dew. Later they begin egg deposition. The eggs are placed under the skin of the ripening fruit. The maggots, upon hatching, tunnel through the pulp, finally locating near the pit. They mature in three weeks or more, leave the now decaying cherry, drop to the soil and transform again to the brown puparium.

Varietal Susceptibility.

All varieties of cherries are attacked. The later black varieties of sweet cherries as the Late Duke and Lambert and seedling varieties are most heavily infested. Often infestation is as high as 30 to 90 per cent of the crop. The earlier white-meated varieties are much

more generally infested than is supposed. In the normal season, these cherries are picked before the maggots attain any considerable size and in the white meat are so inconspicuous that their presence is not readily detected.

Control.

Excellent results have been obtained in the use of sweetened poisoned sprays for the adult fruit flies. These sprays should be applied as soon as the adult flies appear. It is necessary, therefore, to make occasional field observations during early June for the presence of the adult fly. (See figure 1.) A second application should be made about ten days after the first, or even earlier if rains destroy the efficiency of the previous spray.



Fig. 1. Adult cherry fruit fly, showing characteristic banded wings.

Sweetened Poisoned Spray.

Lead Arsenate.....	3 pounds
Cheap Molasses.....	2 gallons
Water	50 gallons

Apply as a fine misty spray to the outer foliage. Use about a quart of solution to the tree.

Limited tests and the experience of some commercial growers in the Cove district of Union County indicate that the regular arsenic sprays 2-100 as applied for the cherry slug, when applied during the active period of the adult fruit flies, are very effective in the control of the maggot.

The Shot-Hole Borer.

It is the exceptional cherry orchard, probably, in which from time to time an occasional tree does not develop a severe case of shot-hole borer infestation. This condition has been particularly common during the past three seasons, following a series of adverse climatic factors which tended to devitalize the orchard trees.

Description and Seasonal History.

The shot-hole borer passes the winter as an adult beetle in tunnels formed the previous season in the tree. The females become active in the late spring and

seek suitable trees for attack. They tunnel into the tree for a short distance and then commence the formation of side galleries. The side galleries are used for egg deposition. The beetles later plant spores of the "Ambrosia" fungus, the material upon which the larvae feed and then proceed with the formation of other similar side galleries. One beetle will prepare a number of these galleries extending the main tunnel as required.

The larvae feed upon the "Ambrosia" beds of fungus growing in the galleries. They require about four weeks to grow to maturity. Successive broods as produced by the adult female continue to mature during the season. The grubs later become quiescent and transform to adult beetles in the tunnels where they remain until the following spring. There is but a single generation during the year.



Fig. 2. Shot-hole borer injury to twig.

The Injury.

Apparently vigorous trees suddenly exhibit signs of devitalization. Usually the whole tree is affected, though the attack may be confined to one side of the tree or to a single limb. An examination of the affected trees disclose numerous small shot-hole tunnels in the bark. Upon examination, a small, blackish-brown, bluntly built beetle is found within the tunnel. The combined attack of numerous beetles with their tunnelling tends to girdle or seriously weaken the tree. Heavily infested trees exhibit serious symptoms. The foliage becomes yellow, the forming fruit shrivels and often the infested trees succumb to the attack.

Only Devitalized Trees Attacked.

Careful studies have proven conclusively that this serious pest does not breed successfully in normal, healthy trees. The beetles are attracted to and breed successfully only in devitalized

46381—BetFrt—2-24-21—J Galley 2 trees that have developed sour sap. Trees injured from any one of a variety of causes, the most common being winter injury, are the inviting host for this borer.

The larvae, contrary to the general rule of similar forms, do not tunnel in wood. They belong to a group termed "Ambrosia Beetles" and feed only on Ambrosia fungus planted by the adult beetles. This fungus grows in the presence of sour or fermented sap.

Control.

Discover the initial cause of the devitalized condition of the tree if possible, be it winter injury, poor drainage, root injury, need of irrigation or otherwise. Practice such measures as are most needed in the way of fertilizers, improved cultivation, irrigation, drainage, etc., to revitalize the trees. Paint the infested trees in the spring covering the infested portions only with the following:

Water 3 Gallons
Soft soap or liquid fish oil soap. 1 Gallon
Crude carbolic acid..... ½ Pint

Apply when infestation is first observed and repeat at weekly intervals until three treatments have been given.

The Cherry Slug.

The cherry and pear slug occurs as slimy, greenish-brown, mollusk-like larvae on the foliage of both pear and cherries. They cause a typical skeletonizing effect of the foliage. The adult of the slug is a small robust, wasp-like insect, known as the saw-fly.

Seasonal History.

The winter is passed in the soil. The adult saw-flies become active in late spring and deposit their eggs within or between the two surfaces of the leaf. The ovipositor of the female is peculiarly modified for slitting the tissues for the purpose of egg laying and it is due to the presence of this saw-like organ that the insects get the name of saw-fly. The young larvae on hatching attack the surface of the leaves, feed voraciously and are mature in about 25 days. They drop to the soil, tunnel in and pupate and give rise to a second generation of slugs during August and September.

Control.

Spray for the pest when it appears. Regular lead arsenate sprays, 2-100 are effective and probably advisable for a large acreage. Finely divided dusts of any sort are excellent as a contact spray. Road dust, ashes, sulphur or the orchard dust sprays prove very effective.

The Black Cherry Aphis.

The cherry aphis is of wide distribution and general prevalence in the Northwest. The masses of curled and distorted foliage on the terminal branches, the typical evidence of aphis attack, is a common and disgusting sight in our orchards.

Description and Seasonal History.

The aphids are the usual soft-bodied, long-legged, plant louse type, mahogany brown in color, robust and active. They



Fig. 3. Twig of cherry showing rolled and distorted foliage due to attack of cherry aphids.

pass the winter mostly as eggs on the cherry tree. These eggs hatch in the spring. As with most plant lice all of these forms are sexual females having the unique ability to give birth to living young. The true sexed forms appear only in late autumn. After the earlier generations both winged and wingless individuals occur. The rate of increase is enormous and the foliage of the affected trees soon develops the typical curled and distorted appearance, the interior of the crumpled leaves bearing a mass of aphids, honey dew, lady birds and ants.

The winged aphis produced in the colonies may migrate to other trees, though generally in mid-summer the

majority of the cherry aphis desert the cherry and fly to the shepherds purse where they continue to feed and reproduce until early fall. They return to the cherry tree in the fall, the sexed forms develop, eggs are deposited, and so the winter is passed.

Ants and Aphis Cooperate: A very interesting relationship is found between the cherry aphis and their attendant ants. In the fall of the year as adverse climatic conditions develop, the ants collect some of the cherry aphis and probably their eggs as well and transport them to their colonies. Here the aphids are maintained until the following spring when the ants return them to the foliage of the cherry. They guard the aphids from their natural enemies, attending them carefully until the colonies of aphids develop to a considerable size. For this service they receive or appropriate in return the honey dew which the aphids secrete.

Control.

The regular contact sprays as applied generally for aphids will control the cherry aphis if the spray actually wets the insect. The difficult thing is to wet the aphids in the curled leaves. This same handicap is evident in an attempt to spray (except at the proper time) for most of the orchard plant lice. The standard aphid spray for orchard conditions and of equal merit for the cherry aphis is lime-sulphur 5-100 plus Black Leaf 40, three-fourths of a pint to the hundred gallons. This should be applied as a delayed dormant spray or just as the buds are bursting well and before they are open.

Use Tangle-Foot Barriers: The ants tend to reinfest the tree with aphids subsequent to the application of the standard aphis spray. To prevent this, in connection with the spray, apply some mechanical barrier about the trunk of the tree to shut out the ants. Bands of tree-tanglefoot about three-fourths of an inch wide are very satisfactory. Bands of cotton batting or other mechanical devices may be used. This treatment in conjunction with the spray application is very necessary.

To thrive properly grapes require a well-drained soil of good fertility.

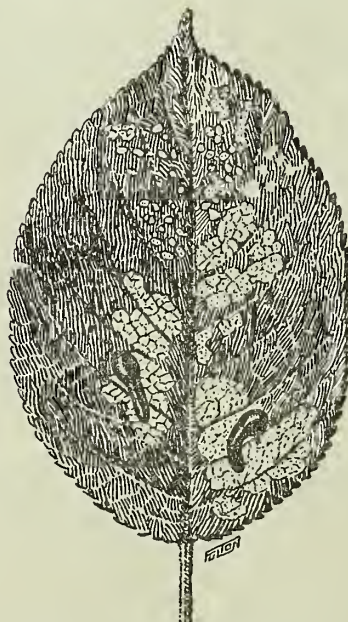


Fig. 4. The pear and cherry slug on foliage.

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Peach Growing in the Pacific Northwest

WITH the many processing plants that have been established throughout the Northwest the possibilities of a greater development in peach growing are being emphasized with a view to having the peach take its place in this section with the greater growth of other fruits.

Many sections of the Northwest are especially adapted to peach growing and with adequate marketing facilities peaches are a very profitable crop.

In growing peaches in this region C. I. Lewis who has investigated the matter says in part:

"Generally speaking peaches prefer a light, sandy loam. Many of the volcanic ash soils of the Inland Empire are ideal. In Southern Oregon we find that the granite soils of the hills are the best, while in the region west of the Cascade Mountains the sandy loams of the river bottoms should be selected. Occasionally the red-shot hill lands of the higher exposures of the valleys are good.

"The proper elevation at which to grow this crop is largely relative. In a general way the lower elevations are to be preferred, as they are apt to be earlier and nearer good shipping facilities. In the western part of Oregon we find that peaches should be grown either at the lower elevations or else at a fairly high elevation. That found in between is often more exposed and subjected to frost.

"The peach is an early bloomer and is therefore often caught by frosts that would not damage to any extent the apple or pear crop. One should avoid draws where cold air settles. In frosty regions the northern exposures are apt to be better than the southern. Large bodies of water, such as lakes or rivers, exert an influence. We notice this particularly in the case of the Columbia

and Willamette, the regions in close proximity to these rivers being less frosty. Good air circulation is an essential of successful peach growing. The site should also be near good marketing facilities, as the peach is a very perishable crop.

"Before planting the ground should be given thorough preparation, much as is practiced with other fruits. Occasionally peaches are grown successfully in Western Oregon on land that has not been entirely cleared, some of the stumps being allowed to remain to rot while the peach orchard comes into bearing. Probably the early spring months, such as March and April, are to be preferred for planting. Give your trees plenty of room. You want a broad, spreading tree instead of a tall, rangy one. Many growers who formerly planted 12x12 are now allowing 20 feet for the tree.

"The budded one-year-old trees are to be preferred, as they adapt themselves to conditions more easily and give the grower a chance to start his trees low, with well formed heads. As regards variety, the number grown at the present time is rather limited.

"No one phase of peach culture is so neglected as the pruning. We must start with the one-year-old tree. This is generally topped at about fifteen inches from the ground and the head in some cases formed as low as eight or nine inches. The present tendency is toward lower heads. Vigorous trees that have not been exposed to hardship can be trained to a whip, but where there is some doubt as to their growth it is sometimes advisable to leave one or two buds on the small laterals. At the end of the first year it is advisable to select from three to five of the best branches, and remove all the remain-

der. Cut back these frame branches from ten to twenty inches, according to conditions. In the selection of these branches you should keep in mind that a broad-spreading tree is desired, and the pruning the first two seasons should be with this view in mind, coupled with the fact that you must also have strength if the tree is to bear large crops. After the framework is well formed the aim should be to develop as much strong bearing wood as possible. The fruit is always borne on the one-year-old wood. The fruiting wood at the lower and inside portions of the tree is liable to die out, unless care be taken to thin out where the growth becomes too heavy, and to head in somewhat to force out new lateral growth. Wherever trees tend to become too rangy head them back. This may be at the expense of some fruit, but the peach naturally tends to overbear. In years of no crop the peach grower has a fine opportunity to head back rangy trees and produce an abundance of wood for the next crop. Rather old trees that have been neglected can be rejuvenated by removing practically the whole of the top, cutting back the main branches to stubs. In two years a magnificent top can be developed.

"Cultivation should be very thorough in the springtime. Where irrigation is not possible this intensive cultivation is generally necessary up to the time of maturity of the crop. There is a danger at times in cultivating young trees and sometimes bearing trees too late into the fall, thus not allowing the trees properly to harden so as to ward off winter injury. With irrigation the same rule applies. A tree should never be allowed to suffer for water; at the same time the water should be so applied that for a period of three weeks during the maturity of the fruit no application of water will be necessary, as too much water at this time will result in a large, coarse peach which is watery and insipid and of poor shipping qualities."



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"Pedigreed" Trees—Where Do We Stand?

By A. E. Murneek, Assistant Professor of Horticultural Research, Oregon Experiment Station

(Continued from February Number.)

THERE is no limit to the number of fluctuating variations. All characters of the tree and fruit are subject to fluctuations. It is one of the means of adjustment of the organism to gross changes of the environment. It may sometimes express itself, in extensive regional variations or fluctuations of one or more characters of a variety. The eastern varieties of apples, for instance, when grown in the west assume a different, generally more oblong form. The soil, atmospheric conditions, cultural practices, such as pruning, fertilization, spraying, irrigation, may cause marked fluctuations from the average of trees in a whole region, an orchard, the individual tree, or only a part of the tree. Most probably the effect of food supply would be of prime importance as a factor causing fluctuations. Thomas A. Knight, the eminent English horticulturist, recognized this fact when he said that "Nutrition reigns supreme in the whole realm of variability." So, too, Darwin was of the opinion that "of all the causes which induce variability, excess of food is probably the most powerful." The complexity of the situation becomes at once evident when we consider that frequently more than one and often all of the factors enumerated above may be the direct or indirect causes of this type of variations. Moreover, it may exhibit itself in varying and changing degrees.

Fluctuating variations as a rule are extremely seldom if ever inherited, that is, they may not be perpetuated either sexually through the seed or asexually through cuttings or buds. Any attempt to propagate by means of buds, a tree that is bearing particularly heavy crops, or well formed or highly colored fruit, if these characteristics have been brought about and maintained by favorable environmental conditions and hence are of a fluctuating nature, would be of no avail. Neither the output of an orchard nor a particular strain or characteristic of the variety may be accentuated or established by this practice. For the sake of emphasis may it be repeated once more that such variations or fluctuations are not transmissible.

This permits us to explain why bud selection experiments of the agricultural experiment stations, as stated previously, have given almost invariably negative results. As an example, trees propagated from heavy and light bearing Ben Davis at the Missouri Agricultural Experiment Station did not come true to the parent plants—the bearing habit was not transmitted. Likewise strawberries propagated by means of runners (buds) for ten generations at this station, gave the same results—the offsprings from high yielding plants were no more productive than those from parents with a low record of bearing. Moreover the variations exhibited by the two would-be

strains were just as great as in the original stock. Similar negative results with strawberry selection have been reported from other stations.

Recently a full account has been published of exhaustive apple-bud selection investigations of the University of Illinois Agricultural Experiment Station. Buds from twenty-one varieties were used in connection with this work. They were chosen in regard to their size and location on the tree. It was found most conclusively that, for purposes of propagation, there is no difference between buds of large and those of small size. Neither does it make any difference from what part of the tree the buds are taken.

So much for fluctuations. Another type of bud variation is, however, not infrequently exhibited by plants. It differs most distinctly from ordinary modifications or fluctuations, though a strict line between the two is often difficult to draw. In horticultural literature variations of this character are known as "bud segregation," "vegetative mutation," "bud sports," or simply "mutations" or "sports." For the sake of clearness and brevity let us call this type of variations true "variations" or "mutations." In cases of mutations the internal or genetic constitution of the bud has changed. The "blood" of the tree or branch is different, the external environment, the orchard practices, having very little, if anything, to do with this striking and permanent change in the plant. May it be remembered here that fluctuating variations on the contrary are caused solely by environmental differences.

A word as to the frequency of bud mutations. In *Coleus*, a greenhouse plant, it has been found that one true but variant may occur in from 500 to 20,000 normal buds. While in cases of other plants, like the potato or tobacco, it may be as rare as one in 200,000

plants. It is not known how often bud variations are exhibited by deciduous trees, the apple for instance. We can assume, however, that they may be as infrequent as in the instances cited. Dorsey tabulated the parentage records of 2,664 leading varieties of apples, cherries, grapes and plums and found only five cases of origin from true bud variations ("sports").

Bud mutants are of the greatest importance to both horticultural science and practice, for (1) they are often inherited and hence are transmissible by seeds and (2) in most instances they may be established and propagated by vegetative means, such as cuttings, grafts, buds, etc. This type of variation or mutation may establish a strain or a new variety and may increase the output of the orchard, if the mutation is in the direction of greater fruitfulness.

A large number of instances of true bud variations or mutations have been recorded, only a few of which may be mentioned here. Beach has described and named a deep-colored 20-ounce apple, which has been propagated asexually and is now known as Collamer. The heavy bearing Paragon is supposed to be a bud sport of Mammoth Black Twig. Kraus discovered a striped branch of Bartlett pear. It bears striped fruit and shows unmistakably the characteristics of a bud mutant. Yellow plums have given rise to fruit of red color. Purple grapes have produced green fruit. Shamel has described a new variety of the French prune, the Coates, which originated as a bud sport on the Petite. The existence of several distinct strains of Italian prunes has been mentioned. The nectarine originated as a bud sport on the peach. Many more instances of true bud variations resulting in increased size—or in differences in the form of the fruit could be cited. So, too, the time of

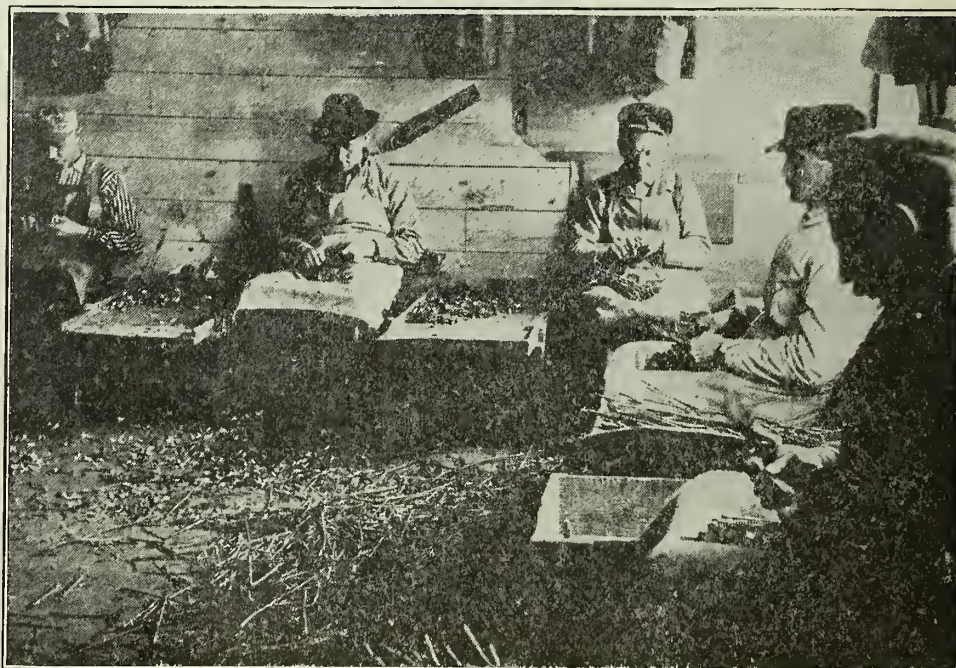


FIGURE 1. Apple trees are bench grafted before they are set out in the nursery row.

maturity and the quality of the fruit may be affected because of bud variations. Moreover, but mutations may occur in any part of the tree, though it may not be directly evident in the fruit. Undoubtedly the largest number of mutations are exhibited by the tree proper. But because of their lesser practical importance, they have escaped observation and reference.

It is of particular value to emphasize here that the productivity or performance of the tree may be determined in many instances by bud mutations. In respect to economic value, it may have worked in either direction—toward greater or lesser productivity of the tree. Shamel's work with citrus fruits, shows us quite clearly that here we have to deal with instances of real bud variations or mutations ("bud variations"—Shamel) that are of tremendous economic significance. Individual trees or whole orchards may have been propagated from buds that could have been called mutants or variants in respect to their bearing habits, which in many instances has been in the direction of lessened productivity.

Already as early as 1910 Coit expressed the belief that through unintentional propagation of undesirable sports, an increasing proportion of trees in citrus orchards of California are of the drone type. The investigations of Shamel tend to show that this most probably is the case with all varieties of citrus trees. It appears that because of convenience and economic considerations, bud-wood has been obtained from trees of low degree of fruitfulness. At least, some such trees may have come about because of bud mutations. These variations have thus been propagated bringing about the present condition.

The question now arises as to whether such a state of affairs could possibly exist in some of our deciduous orchards. At present there is no evidence to show that it does. In the first place, as already mentioned, deciduous fruit plants seem to vary or mutate far less frequently than citrus trees, though some varieties may do so more often than others. The Baldwin apple, for instance, is said to sport more often than most any other apple. Perhaps this is due primarily to the length of time this variety has been under observation. The whole Ben Davis group is supposed to be also in a state of instability. But as the question of new varieties is not of so great an interest as the increase in profitability of the orchard, the matter may be settled only by the keeping of extensive performance records of the individual trees. Will it pay to keep such records?

The meager evidence that we have from our experiment stations throws but little light on the subject. Data gathered for four years of the yields of 1,240 trees at the Virginia experiment station show that some 400 trees of this lot produced four barrels of fruit per tree, making up 60 per cent of the crop, while 200 other trees averaged less than a barrel per tree. Yield



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records of McMahon, Patten and McIntosh apples kept for 18 years at a Canadian station have given similar results. The most productive trees yielding about twice as much as the least productive ones. How much these differences in fruitfulness may be ascribed to environmental conditions, such as soil, moisture supply, etc., is an open question. But because of the frequency and importance of fluctuating variations we would be safe to assume that the environment is the main, perhaps the exclusive factor. Then, too, since the stock on which almost all of our fruit trees are grown is a seedling, undoubtedly this has a whole lot to do with these differences in performance of the trees. (The subject of the reciprocal influence of the stock and scion will be discussed in a subsequent article.)

Granting all this, we are still confronted by the possibility that the wide differences of productivity of our fruit trees may be due to the unintentional propagation of low producing strains—bud variations or mutations of an unproductive or drone type. Commonly trees that are shy bearers exhibit exceptional vegetative vigor. They produce good bud wood. They are tempting, convenient and adaptable for propagating purposes. It must be understood, however, that there is no information on hand that any such drone strains have been propagated and are in existence in our orchards.

Lacking such an evidence, what can the prospective orchardist do to safeguard himself against such a possibility? Lately there has been manifested a growing and persistent demand for the best, the most reliable trees. To meet it many nurserymen have been offering "pedigreed" trees, taking advantage of the meaning associated with

the term "pedigree." Some of such trees probably are no better than any other stock save perhaps that they have been chosen for their healthy appearance and size. Others have been grown from buds or scions obtained from trees that were thought to be superior in respect to general vigor of the tree and the quality and quantity of fruit they have borne.

May it be stated here that the term "pedigreed" is a misnomer. No tree can really be called pedigreed unless its genetic constitution or at least its vegetative parentage can be traced back for a large number of generations. It would be far more correct if such nursery stock, as Coit has suggested, should be known as "selected."

No absolute guarantee can be attached to trees selected in this manner. Though the parent plant from which bud wood was cut for propagation of the stock may be all that could be desired, there is no assurance that the offspring will be a chip of the same block. The good qualities and behavior of the scion tree may be due to the exceptionally favorable environment and good care to which it is exposed. In other words, it may have exhibited fluctuation that can not be propagated. Such trees, however, carry some assurance with them at least. They have not been grown from buds of an unproductive tree—one belonging to a drone strain. It is to the honor of many reputable nurserymen that they do select their bud wood with care.

It is almost needless to emphasize here that the roots or stock upon which the tree is grown undoubtedly has frequently a decided influence upon the behavior of the tree. Witness the dwarfing of a tree if grown on certain roots and the performance of the latter to various soil conditions. The Illi-

nois bud selection experiments show us that the stock used reflected in some degree on the scion grafted on it. The little rogueing that is practiced by nurserymen in selecting roots for grafting or budding purposes is largely in respect to vigor of growth. We know next to nothing about the compatibility of various stocks to the scions or buds set on them.

Any grower contemplating the setting out of an orchard should exercise the greatest care in buying his trees. He should verify the reliability of the nursery and assure himself of the absolute health and high degree of vigor of the nursery stock. Then one must always bear in mind that the early neglect of a plant is often very telling upon its subsequent behavior. The young trees, while grown to perfection in the nursery, are often put under the most trying conditions in the orchard. Frequently enough they are entirely forgotten and left to struggle for their very existence.

In the meanwhile may it be hoped that further and more extensive investigations respecting bud selection and tree performance of deciduous fruits, more or less similar to the work done by Shamel may throw additional light on the subject. The fruits of the Northwest have always been conspicuous for their quality. Anything below the C grade was frequently seen rotting on the ground. With the advent of the fruit products plant the quantity of the crop is, however, beginning to count more and more.

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PORTLAND, OREGON

Fertilizer for Orchard and Bush Fruit

By Gordon G. Brown, Hood River Experiment Station



Gordon G. Brown

For the Apple Grower.

It must be made plain to the apple grower at the outset that the only fer-

THE time is rapidly approaching when the fruit grower must apply his fertilizer. The aim of this article is to assist the grower to decide in ample time what practice he shall adopt in order that his requirements may be provided for.

tilizer from which we have had any appreciable response has been nitrate of soda or some other fertilizer high in nitrogen. On a limited scale, experimentally we have had equally good results from sulphate of ammonia.

It is impracticable to attempt to lay down any blanket recommendation for all growers. Obviously, the age of trees, character of soil, previous culture methods, pruning, cover or shade crops, fertilization previously practiced must be carefully considered before any rational plan may be submitted. However, for the sake of argument we will

Continued on page 23.

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Consult your nearest government experiment station or county agent as to its application and the results you may expect.

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Take Care of Nursery Trees

Large numbers of nursery trees, especially fruit trees, either fail to grow or are badly set back by carelessness and delay in planting. Such trees may have been well grown and vigorous in the nursery, and may have been well protected in winter, packed carefully, and shipped promptly, but are so poorly handled before planting that they are seriously damaged. In many cases the blame that is laid on the nurseryman is really the fault of the buyer and planter. The Bureau of Plant Industry, Pennsylvania Department of Agriculture, gives the following points regarding the treatment of nursery trees so as to obtain the best results.

(1) As soon as received examine the roots to see if they are still moist. If not moisten them immediately and keep them so until they go into the ground. Never allow the roots to dry out even for a few minutes.

(2) If the trees cannot be planted immediately heel them in by digging a shallow trench and covering the roots and lower stems with moist earth.

(3) Just before planting prune both roots and tops. Take away most of the fibrous roots which are likely to be dead and useless. Cut such small rootlets near the larger roots with a clean cut. Always trim the roots with a slanting cut on the under surface to hasten rootlet growth.

Prune the top to a single whip and shorten it so that the top will make a trunk of the desired height. After growth is well started pinch or rub off all but the three or four shoots that will be needed to form the main branches of the tree.

(4) The soil should be loamy and loose so as to allow the new rootlets to reach said food very quickly after they are formed.

(5) Plant a few inches deeper than the tree stood in the nursery. The hole should be large enough to contain the roots in their natural position without bending or crushing.

(6) Do not merely fill in the hole after the plant is set and tramp the earth about the surface. First add some top soil and pack it firmly, then add more and tramp this in, and so continue till the hole is filled. This careful packing is needed not only to bring the roots in close contact with the soil and thus give the reduced root system every opportunity to absorb water, but it also helps to hold the plant firmly in a correct position till the new root system can obtain a secure hold.

(7) If by any chance the trees arrive in a badly dried out condition bury them in damp but not wet earth and leave them in the ground for four to seven days. This will bring them back into condition and may save a heavy loss to the buyer.

Never has the demand for berries for market been better than at the present time. While there has been some difficulty in marketing other fruits berries have more than held their own with the result that there has been a greatly increased planting.



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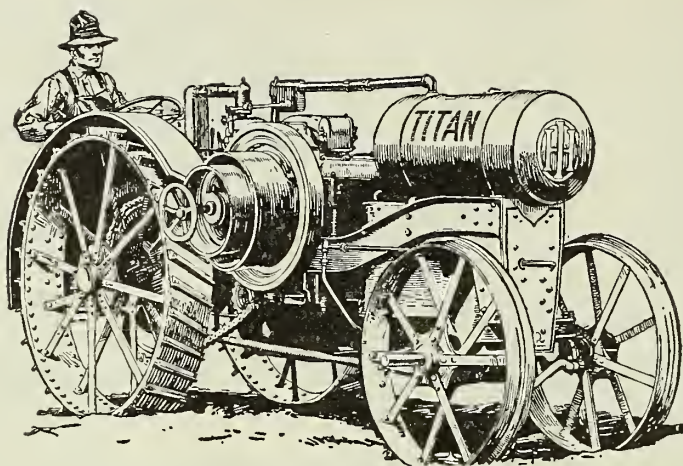
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Small Fruit Diseases and Their Control

By H. P. Barss, Plant Pathologist, Oregon Experiment Station

LOGANBERRY Anthracnose: Small spots with light centers and dark margins on canes and leaves. May attack fruit, causing discoloration and shrivelling of drupelets of berry. Drying up of fruit due to dry weather or lack of soil moisture, or root-cutting or borers may be mistaken for anthracnose effect. Caused by a fungus. Spread by spores produced in spots on canes and leaves. Favored by damp weather. Carried over on dead leaves and old canes. Control: Cut out old canes and badly spotted new growth immediately after picking. Spray with Bordeaux (4-4-50) with soap or other spreader (1) when first new leaves in spring approach full size; (2) just before bloom; and if necessary spray (3) about two weeks after petals fall with Burgundy (2-3½-100). If disease has been bad, spray new canes with Bordeaux soon after cutting out old growth in summer.

Bluestem of Black Cap: Dark discoloration of cane followed by wilting and drying up. Cause: A soil fungus which attacks roots and growing up inside canes plugs sap tubes. Spread in soil. Control: No preventive known. When started will gradually take whole patch. Growers must abandon old ground, starting new on healthy soil with sets from healthy plants in healthy fields.

Gooseberry Mildew: Whitish powdery growth on foliage and fruit turning dark brown. Ruins fruit. Worst on European sorts. Cause: A fungus which lives over winter on branches and within the buds and spreads on leaf and fruit surface like a mold. Spreads also by spores carried by wind, rain, insects, etc. Control: spray with lime-sulphur, 1 to 25 or 30 when first leaf clusters begin to open out. Cover everything all over. Spray again with lime-sulphur (1-40) just before bloom. Repeat if necessary. Bordeaux will not kill mildew. Dusting the bushes at intervals with the finest grade of dusting sulphur will also keep down the mildew.

Currant and Gooseberry Anthracnose: Small angular leaf spots. Worst on currant. May cause very severe dropping of leaves. Cause: A fungus spread by spores from new and old leaves. Control: Clean up or turn under old leaves before buds begin to open in early spring. Spray as for mildew, but follow fruit harvest at once by another spray, preferably of Bordeaux, 4-4-50. (Lime-sulphur burns worse as the hot weather comes on.)

Grape Mildew: Whitish growth over foliage and fruit. Causes stunting, distorting and hardening of fruit. Caused by a surface mold carried over on old leaves, canes, etc., and possibly in buds. Control: Dust thoroughly with dusting sulphur (finest obtainable). Begin when new shoots are 6 or 8 inches long and repeat at intervals. An application just before bloom is a good thing. Others should be given whenever inspection shows any live mildew anywhere.

Crown Gall: Irregular tumor-like swellings on roots or breaking out from canes. Caused by bacteria getting into wounds, mostly below ground. Spread from plant to plant by cultivation or pruning. Control: None. Pull out and destroy affected plants as soon as discovered. Before replanting remove infested soil and replace with good soil. Do not set out plants with suspicion of galls on roots or crown.

NICOTINE DUSTING.

The Bureau of Entomology, United States Department of Agriculture, has been conducting experiments with nicotine sulphate applied in dust form. Mixed with kaolin to give the poison bulk, 40 per cent strength nicotine sulphate did remarkable work in controlling melon, cabbage, and pea aphids, onion thrips, and western cucumber beetles. All these insect pests are hard to reach with ordinary sprays, but the floating dust settles upon the under side of the leaves as well as on the surface. The experi-

ments show that much larger areas can be treated in less time than is required by spraying. Moreover, the equipment necessary to apply the dust is much less expensive than a spray outfit and its cost of application is less than by the older method. It weighs less than spray and is more conveniently handled. It can be mixed with arsenate of lead or sulphur for use against insects and fungus diseases.

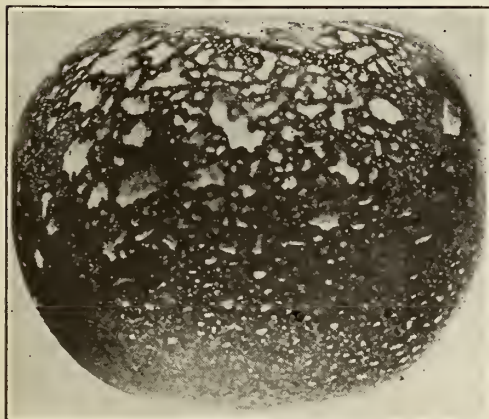
O.A.C. Experiment Station Notes

It is not economy to skimp in the use of spray materials in orchard insect and disease control. Growers whose reports show less than average spray materials per tree invariably report poor control and losses. Those that show a uniform usage throughout the season just as regularly report good results.

All brown rot mummies and dead spurs are removed in pruning stone fruit trees on the Oregon Agricultural College experiment station farm. Likewise all mildewed twigs are cut away in pruning the apple trees. A large amount of infection arises from these sources unless controlled when the trees come out in the spring.

Most plant diseases are more easily controlled if the host tree is pruned to thin out the top well, leaving such distribution of branches as favor entrance of sunshine and circulation of air. This type of pruning also makes spraying easier and more thorough, and allows the fruit and foliage to dry off more promptly, which hinders germination of disease-bearing spores.

This is the time to look over the harvesting equipment, for in thirty to sixty days the spring work will commence and from then on there will be no let up. Give all working parts plenty of oil. Tighten nuts, and replace any that are missing. Do not wait until you are ready to use it, do it now.



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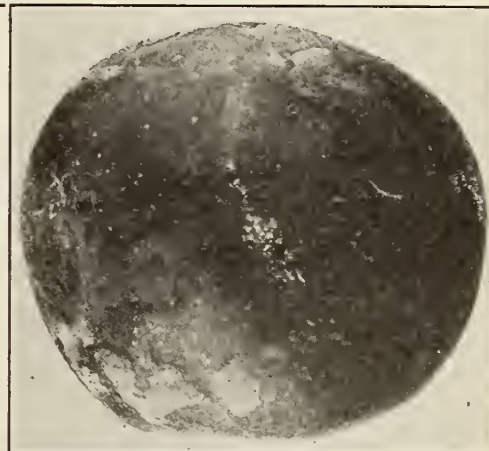
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The Nursery Business

By C. A. Tonneson, Executive Secretary Pacific Coast Association of Nurserymen.

THE nursery business as it exists at the present time is a development of the propagation of trees and plants to meet the requirements of the domestic and commercial planters all over the country. In the early stages the nurseryman grew only a small block of the kinds of trees required in his immediate vicinity. Expenses were nominal, risks and hazards not considered. With the development of commerce the demand for nursery products expanded, orders coming from innumerable interstate localities and nurseries naturally became both manufacturing industries and selling concerns on an increasingly large scale.

It naturally transpired that a considerable number of the good propagators were not skilled in business matters and therefore unable to fill requirements of an efficient distributing system. Others knew how, also, to do the selling but were unable to handle properly both departments of the vocation. Many of those engaged in the work therefore, gave attention only to the growing and sold at low wholesale prices to parties who developed the business of selling and distributing. The result was that responsibility for an ideal product was not definitely fixed. In some cases unscrupulous distributors would buy from growers whose methods were more or less deficient, because their prices were lower than those of others who observed painstaking methods and in cases where these distributors did their own assembling and filling of orders, labels would sometimes get mixed. This created dissatisfaction on the part of planters and caused a reflection on the entire nursery vocation. In later years reputable nurserymen realizing that a reform was necessary have devised methods whereby the growing, the sale and distribution might remain under their control until the products were in the hands of planters. This reform has not been an easy job and considering the thousands of acres of commercial

orchards planted and the small per cent of mistakes which have occurred their endeavors show good results.

But for years previous and up to the world war the nursery business was hampered because of both indifference and ignorance on the part of some propagators as to the requirements and the actual expense incurred in the production of reliable products. This caused a selling price in many cases too low for the production of a standard and satisfactory product, the few cents thought to be saved by the buyer in reality causing him dissatisfaction.

At a recent meeting of the Pacific Coast Association of Nurserymen action

was taken to eliminate as far as possible, every element of inefficiency. A standard of ethics was adopted, now bearing the signatures of a majority of leading nurserymen on the coast and of some of the states east, which signifies all reasonable endeavor to conform to sound and approved methods and square dealing as implied in their trade mark, "Dependable Nursery Products."

This cooperative endeavor also includes a fight against unscrupulous schemes and fakers, and against carelessness in any matter that may work to the detriment of the valuable horticultural industries of this country.

MYERS SPRAYERS

"HONOR-BILT"

"Make Profits More Certain"









SPRAYING is in order—Dormant spraying is already being carried on in many localities—soon will come the general activities now universally indulged in during bud and blossom time—following this, a repetition of the work during summer months completes the cycle of protection.

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Interplanting in the Orchard.

An announcement recently made by the United States Agricultural Department is to the effect that cotton as an interplanted crop is finding much favor in the San Joaquin Valley of California. It seems to be especially well adapted for use in first-year vineyards or in young orchards. In Department Circular 164, issued by the United States Department of Agriculture, a representative of the Bureau of Plant Industry reports that a Kern County farmer planted cotton between young apricot trees which were making their third-years' growth. From about two acres of orchard land he harvested nearly \$500 worth of cotton in 1918. The cotton plants occupied only 1.27 acres of the entire plat. In this instance the farmer was enabled to pay the upkeep costs of his orchard with the proceeds from his cotton and to pocket a good profit in addition.

Another farmer in the same county set out 12 acres of grapevines and interplanted with two rows of Pima (long-staple cotton) placed between each two rows of the vines. He obtained a yield of nearly a bale to an acre. At the end of the season his vines were in excellent condition, only one being lost in the entire lot. Specialists say the practice is a profitable one; the cotton is as good as when grown alone, and the young grapevines are equal in every way to those grown without an intercrop.

While intercropping has been practiced successfully and beneficially in orchards in many instances with such crops as alfalfa and clover we believe that care should be exercised in planting crops in orchards that are not legumes. The success of orchardists in California in planting cotton as an intercrop is interesting and proved profitable. The question, however, is how long will the soil of an orchard stand the extra drain from such a crop as cotton which requires a large quantity of plant food to mature properly. It would seem that continued planting of this or a similar crop in an orchard must result in affecting the growth or bearing qualities of the trees in a light crop of cotton or possible unprofitable returns from both.

The Importation of Fruit Pests.

Discovery of heavy infestations of brown-tail moth nests on fruit seedlings and of nests of the white-tree pierid on other shipments received from France have caused a general warning to be

telegraphed to state officials by the Federal Horticultural Board, United States Department of Agriculture.

The board expresses a fear that there has been laxity on the part of the French inspectors and urges careful and consistent examination of all shipments of fruit seedlings from France coming under state jurisdiction. The inspectors of the board at ports of first arrival make a superficial inspection of all foreign shipments of nursery stock to determine their agreement with the permit invoice and original certificate of inspection as to quality and kind of nursery stock, and as to compliance of the shipment with other regulations; but owing to lack of facilities and inspectors it is not possible to make the the port inspection thorough enough to guarantee the exclusion of plant pests.

The French inspection service has been advised by cable of the condition of stock under their certificate arriving in this country, and a warning has been issued to French exporters and American importers. Experiments are under way in Boston to determine the possibility of killing hibernating brown-tail larvae by vacuum fumigation. In the meantime steps have been taken to have all French shipments given such fumigation as is now required for cotton. If vacuum fumigation will not kill all larvae contained in nests it may be necessary to cancel all existing permits for French stock. The board strongly recommends the burning of all packing material.

Inasmuch as there is a possibility of confusing the nests of the brown-tail moth and the white-tree pierid, it is suggested that, if there is any doubt as to the insect killed, it should be forwarded to the Federal Horticultural Board for determination by specialists, after steps have been taken to kill any larvae which may be contained in the nests.

Just what procedure will be necessary to destroy these fruit pests and safeguard the fruit industry of the United States can be safely left to the United States Department of Agriculture. One of the most important matters in connection with this work is that it shall have the cooperation of all interested in the fruit industry in order that this new menace may be effectually stamped out.

Optimism and a Clean Crop.

Misery loves company, especially when the company is more miserable than we are. A few quotations of prevailing prices in Havana may tend to make us more contented with our lot. Grapefruit sells at New York prices, though a few miles from the city they are left to go to waste. A good pair of men's low shoes are priced as high as \$28; flannel trousers at \$35; silk shirts at \$30, and \$8 for a cotton umbrella is considered cheap. Cigarettes which cost us 20 cents sell for 60 cents there, and for a \$2 box of American candy they ask \$7. For a fairly good suit of clothes, out of stock, the Havana merchant charges \$100; for women's wear it is even higher. Let us take

comfort from this comparison, and agree, each one to do his "bit" by talking optimism, doing a full day's work, and determining to make the 1921 fruit crop at least the cleanest we have ever raised.

Fruit Trees for the Farm.

Every farmer where it is possible to grow them should have a few fruit trees in a fenced orchard or yard. An acre is little enough, but at least any farm should have ten apple, five peach and five cherry trees. These cost but a trifle, but if cared for properly will supply a family with fruit in some form for the entire year. Then a row of raspberries, blackberries, currants and gooseberries and a square row of strawberries will add much to the happiness of the family.

What the Papers Interested in Fruit Are Saying

The establishment of a frozen fruit industry would furnish another outlet for fruits that otherwise might be wasted or at best find only a sluggish market. That the well-known methods of preserving fish, meat, poultry, eggs and butter by freezing should be extended more generally to small fruits and tomatoes, thus in effect making fresh fruit of these kinds available throughout the year.—*Canadian Horticulturist*.

Very much more needs to be done before the mass of farm women will have even the moderate advantages enjoyed by a limited number, the Secretary of Agriculture points out.

The States Relations Service has published the results of a survey through home demonstration agents of 10,000 farm homes in northern and western states.

Wherever it has been in operation the system of county home demonstration agents has proved to be the most helpful agency for the benefit of farm women, and it should be expanded, the Secretary asserts. He also urges increased appropriations for the research work of the Office of Home Economics of the department.—*New York State Fruitgrower*.

On the Pacific Coast there are four separate power farming and implement associations. They are the Northwest Power Farming Association of Spokane, the Portland Tractor and Implement Association, Portland, Oregon; the Traction Engine and Implement Dealers' Association, Los Angeles, and the California Tractor and Implement Association, San Francisco. These four associations united and organized the Pacific Coast Tractor Associations early in 1920. Members of this Coast association have now made arrangements by which there will be affiliation, even closest cooperation, with the National Implement and Vehicle Association, a large national association which has had more to do with advancing power farming than any other.—*The Sunsweet Standard*.

In the growing of each fruit there are problems which stand out bright above others. The three that we would mention in pear growing are the small pear, fire blight and pear scab. The small pear must go. The time is at hand when our canneries are going to demand the 2½ inch Bartlett. Formerly they would take pears as small as two inch, but they are gradually increasing their demands and will do so more and more as the tonnage increases. It is doubtful if Bartletts as small as 180 and smaller should be classed as Extra Fancy.

Large Bartletts can be produced by giving the trees more pruning, more rigid thinning, better tillage and irrigation when necessary.

Fire blight has been ably handled in this edition by Messrs. Cate and Reimer, and we urge all growers to read their articles. Pear scab is treated in this number and can be nicely controlled if the grower will make up his mind to follow thorough spraying as recommended by the Oregon Experiment Station.

There are a few minor troubles such as the large fruit worm, canker worm and the blister mite. This last is on the increase, but there is no excuse for its presence as it can be easily controlled.—*Oregon Grower*.

A writer in one of the leading agricultural papers states: "It is poor policy to band trees with sticky or greasy substances to prevent insects going up. While it prevents the insects climbing, it seems to be only a question of time when the material kills the tree, especially thin barked trees."

This question was recently referred to Dr. E. B. Fracker, state entomologist of Wisconsin, who says:

Banding trees with sticky substances has long been recommended for the control of climbing insects, such as cankerworms, tussock moths, gipsy and horn-tail moths, and ants which may carry plant lice.

Two forms of these bands are recommended by park superintendents and tree surgeons as being harmless to trees. One is Tree Tangle-foot, made by the O. & W. Thum Company, Grand Rapids, Michigan. The other is "Rau-pen-leim" which the owner can mix for himself and which is used extensively in gipsy moth control in Massachusetts and New Hampshire.

Too much confidence should not be placed in banding as it is useful only for the insects named, but for them it is a valuable control measure. The writer has never heard of the two substances described above injuring trees. Perhaps the writer is referring to tar, printers' ink, and some other compounds which are unquestionably harmful.—*Wisconsin Horticulturist*.

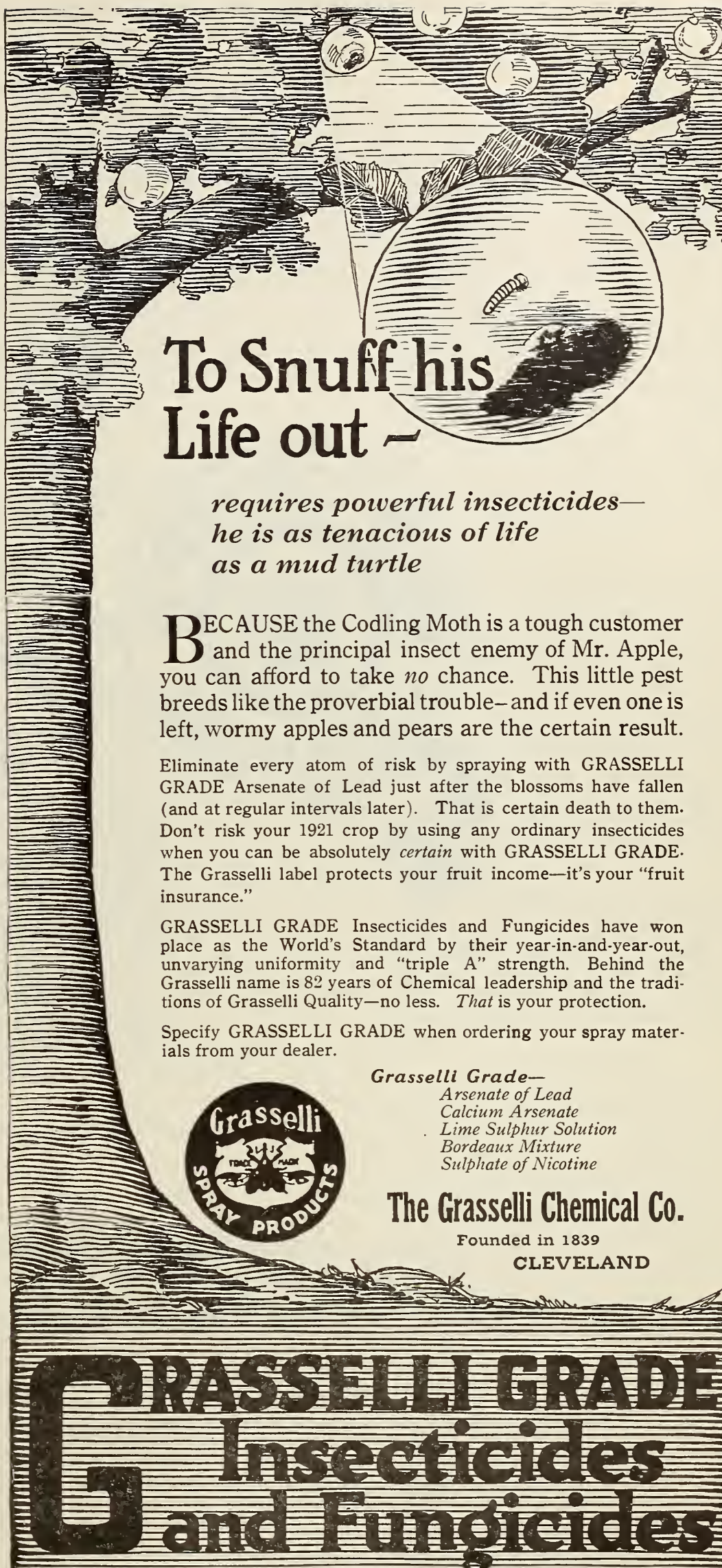
Export of Peaches Partly Successful

An experimental shipment of peaches to Great Britain made during the month of September shows that a demand exists for this fruit if it can be delivered in satisfactory condition.

The quality of the greater portion of the peaches was poor when placed on British markets. The fruit held up for a few days, then went down rapidly. The deterioration was partly the result of overtight packing, which caused bruising and led to the development of decay, and partly the result of a lack of ventilation in the packing and in the ocean storage compartments.

The peaches were packed in crates holding ten double cardboard cartons. The inside space was divided by corrugated cardboard into ten sections on the plan of an egg box. The crates were practically air tight. When placed in cold storage the moisture from the fruit was absorbed by the corrugated partitions of the carton with the result that the partitions became damp and lost their shape. The cost of the crates was approximately \$3.60 each, about one-half the value of the peaches. If shipments of peaches to Great Britain are to be successful and profitable, a cheaper crate with some provision for ventilation must be used.

Some crates holding 160 peaches sold at private sale for £2 a crate (about \$7 at the prevailing rates of exchange) or about 3 pence (nearly 4 cents) each. However, on account of the defective condition of some of the fruit, claims for reimbursement were made on one-third of the sales. The United States agricultural trade commissioner thinks that better prices and a desirable publicity would have been obtained at the Convent Garden fruit auction. There the peaches would have been sold in competition with fruit from Belgium and at least a better test of market value would have been given.



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*requires powerful insecticides—
he is as tenacious of life
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BECAUSE the Codling Moth is a tough customer and the principal insect enemy of Mr. Apple, you can afford to take *no* chance. This little pest breeds like the proverbial trouble—and if even one is left, wormy apples and pears are the certain result.

Eliminate every atom of risk by spraying with GRASSELLI GRADE Arsenate of Lead just after the blossoms have fallen (and at regular intervals later). That is certain death to them. Don't risk your 1921 crop by using any ordinary insecticides when you can be absolutely *certain* with GRASSELLI GRADE. The Grasselli label protects your fruit income—it's your "fruit insurance."

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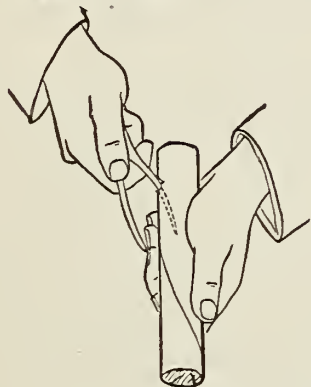
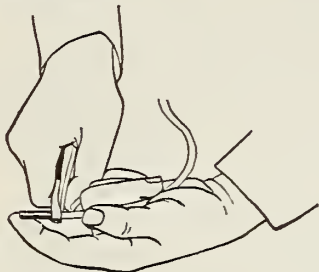
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These tips will help you get better results whenever you use dynamite for land-clearing, ditching, or tree-planting. *Cut them out and save them.*

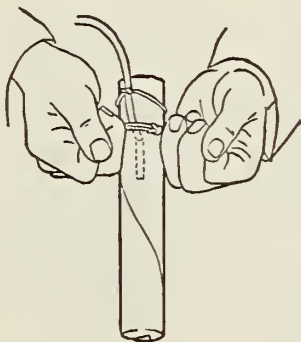
Crimping the Cap

Cut a sufficient length of fuse squarely off, and slip cap over the end. Crimp cap to fuse, as shown, with cap crimper,—it is absolutely essential to **USE A CAP CRIMPER**,—obtainable from your dealer or direct from us.



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Punch a hole with handle of cap crimper in the side of cartridge deep enough to contain all of the cap. See illustration at left.



Securing Fuse

After inserting cap with fuse attached, tie a cord around fuse and then around cartridge, as shown. If several cartridges are needed, this "primer" cartridge is put in last. After loading, tamp earth tightly in hole using a **WOODEN** tamping stick. The success of the shot depends largely on the tightness of the tamping.

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manager of the Hood River Fruit company. Apple boxes were retailed to growers last year at 27 to 28 cents each. A price of 17 and 18 cents, it is expected, will be established this year. The cost of strawberry crates and pear boxes shows a similar decline.

The Wasco Farm Bureau News notes that the cherry orchards in that vicinity injured by the freeze a year ago will need unusually good cultivation this year. Trees which had a great deal of top killed will be in danger of losing a large part of their root system also, and this must be prevented if possible by good care this year. When the top of a tree is suddenly killed, there is often insufficient vegetation to support the roots and some of the roots die. A root system partially dead lets in rots, grubs, and disease. Give the trees as good a chance as possible by keeping the orchards free of weeds.

A meeting of the North Marion County Berry Growers' Association held at Woodburn recently was largely attended. Twenty-three names were added to the membership roll making a total membership in the association of 50. E. J. Forsythe was re-elected president of the association, F. P. Wolfe, vice-president; Ray Glatt, secretary, and Theodore Nehl, treasurer. The executive committee consists of L. Lawrence, W. L. Bentley and C. C. Guilliford. A committee which reported to the meeting on fruit prices for this year stated that the minimum prices should be seven cents on logans, 12 cents on raspberries, nine cents on strawberries and seven cents on gooseberries.

According to a report of the U. S. Census Bureau recently issued Oregon in 1919 had 3,315,093 apple trees, 727,444 pear trees, 2,999,480 prune and plum trees and 395,073 cherry trees. The production of small fruits in 1919 was 18,977,822 quarts, including 4,159,200 quarts of strawberries, 1,824,901 quarts of raspberries, 10,198,011 quarts of loganberries, and 2,139,110 quarts of blackberries and dewberries.

On February 19, C. W. McCullagh, sales manager of the Hood River Apple Growers' Association, reported that only 40 cars of apples belonging to the association remained unsold.

A plan in which the Cherry Growers' Union of The Dalles is taking the lead is the establishment of a cooperative fruit and vegetable selling agency. The erection of a large concrete packing and storage house is being considered in connection with the establishment of the agency.

Oregon prune week, February 14 to 19, to encourage a greater consumption of Oregon prunes, resulted in a widespread campaign throughout the state and the disposal of many thousands of pounds of prunes. In addition to this phase of the work was the valuable amount of advertising which the Oregon prune received in all parts of the country. At the beginning of prune week it was stated that there were 22,000,000 pounds of prunes in the state still unsold.

WASHINGTON.

Unless unforeseen disaster happens to the apple crop of Chelan, Douglas, Okanogan and Grant counties, known as the Wenatchee district, the yield this year will be 16,000 carloads, or 12,000,000 boxes, according to the forecast of District Inspector P. S. Darlington.

This is 4,000 cars, or 3,000,000 boxes, more than the previous high record of the 1919 crop. All indications point to a 100 per cent yield in every orchard. The ground has been soaked by fall rains and heavy snows which melted, going into the soil. Fertilization and cultivation, together with pruning and thinning, have been done under the direction of experts in this district.

To make the 12,000,000 boxes in which the 1921 apple crop of the district will be packed over 60,000,000 feet of lumber will be required. This number would fill 2,000 cars, figuring 30,000 feet to the car, or 40 solid trains of 50 cars each.

More than half the boxes used in packing the Wenatchee district crop are made in that part of the state, but many are shipped from Spokane, Seattle and other Puget Sound points. District mills are now preparing to begin operations for the season in anticipation of the heavy demand for boxes that will develop if the crop comes up to expectations.

In addition to the apple crop the Wenatchee district will probably produce 2,000,000 boxes of summer fruit, which would use up more than 5,000,000 additional feet of lumber.

Paper for fruit wraps will be another item of considerable importance. No less than 6,-

Northwest Fruit Notes from Here and There

OREGON.

The fact that anthracnose has caused many apple raisers in Oregon considerable losses this year is being called attention to as the necessity for greater effort in fighting this disease. Shipments of apples which have arrived in eastern markets from this state are said to have shown losses as high as \$400 per car from this disease.

In discussing the poisoning of bees by the calyx spray A. G. Wing, a Hood River apple grower and also a beekeeper, makes the following interesting observation:

"Is it necessary to leave this spray off to protect the bees? Some think so. For eight years I have kept from 1 to 15 colonies in an

orchard, surrounded by orchards, and I am unable to believe that they were poisoned to any extent. During that time, my colonies became strong during this spraying season, and I have never failed to get from 50 to 75 pounds of honey on an average per colony, and frequently individual colonies have produced as much as 125 pounds. When the petals have fallen the bees no longer work on the apple trees. There is danger, however, of poisoning them in some of the later sprays if an excessive amount of arsenate of lead is allowed to fall on alfalfa or clover in bloom."

The cost of producing a box of apples in 1921 will be approximately 25 per cent under 1920 costs, according to Charles H. Castner,

000,000 pounds will be needed. This would fill 150 cars, carrying 30 tons to the car, or three solid trains.

If apple boxes sell at 20 cents apiece this year the growers will have to pay \$2,400,000, but if they only bring 18 cents, as some authorities predict, the cost to the growers will be about \$2,000,000. Paper at 15 cents a pound will cost \$90,000.

With approximately 100 delegates present the eleventh annual convention of the Western Washington Horticultural Association opened at Port Angeles February 11. The visitors were welcomed to the city by Secretary W. H. Taylor of the commercial club, response being made by Charles W. Orton of Sumner. An interesting feature of the session was Professor J. L. Stahl's reminiscences of horticulture in the Northwest. The Bing cherry and Island Belle grape were named as distinctively Northwest products, having originated here. Mr. Stahl also told of how the berry industry got its start in the Puyallup-Sumner district in 1885. Cherry culture, by C. E. Fitzgerald of Ferndale, and gooseberry culture by F. H. Burglehaus of Sumner, were features of the afternoon program.

Solid train load apple shipments were resumed out of the Wenatchee district on February 19 for the first time since Christmas. The first train to leave this year consisted of 57 cars. Up to that date 7,900 cars had been shipped

from Wenatchee with 1,600 cars still to be shipped. The total crop from the district is officially estimated at 9,500 cars. In addition to this, 1,304 cars of summer fruit were shipped, making total fruit shipments 10,804 cars, valued at about \$16,000,000, compared with 13,700 cars shipped last year, which returned the growers about \$22,500,000.

A report from Wenatchee is to the effect that as a result of the visit there of Aaron Sapiro, organizer of cooperative associations of San Francisco, announcement is made that H. G. Bohlke has resigned as manager of the newly organized Wenatchee District Cooperative Association and his place has been filled by Lee M. Lampson, formerly county agent of Benton County, and recently organization manager for the Washington Wheat Growers' Association. Mr. Bohlke will devote his attention to his fruit business, and Mr. Lampson will conclude the organization of the new association. The election of permanent officers of the association will occur at the annual meeting to be held in March.

The Okanogan Growers' Unit covering territory north of Spokane has begun repacking Winesaps held in storage through the winter. The pack will total about 18,000 boxes. The unit also has on hand about 20,000 boxes packed last fall and not previously shipped on account of low prices.

Increased freight rates have deprived the fruit growers of the Spokane valley of their profits on the 1920 crop of apples. It is declared that lower freight rates will have to be secured for the 1921 crop in order to secure any returns from the orchards. This is the report of several large growers of Opportunity and shippers in Spokane. They assert that the 1920 crop was raised at the peak cost of production, sold on a low market, and moved to eastern markets under the highest freight rates which absorb the ordinary margin of profit. As for the 1921 crop, they assert that lower costs of production will be offset by the low prices, leaving the increased freight rates to absorb the profits. The cost of shipping a box of apples to eastern markets before the two freight increases were granted was approximately 50 cents, shippers say; while the prevailing cost is from 90 cents to \$1, of which more than 40 cents is taken by the increased freight rates.

Bits About Fruit, Fruitmen and Fruitgrowing

The adoption by the United States Senate of the amendment to the tariff bill placing a duty of 4 cents a pound on imported cherries was announced February 17 by Senator McNary of Oregon. The news of this action on the part of the senate is being received with a great deal of satisfaction on the part of Northwest cherry growers and packers who will now be able to more than compete with the cheaper foreign fruit that was being shipped into the United States. Other legislation that is being asked for the fruit industry is an appropriation of \$10,000 for the purpose of studying new spraying methods for codling moth that will not be objected to by eastern buyers as poisonous. The idea of the investigation is to determine if it is possible to discover a spray that will be effective against this insect and

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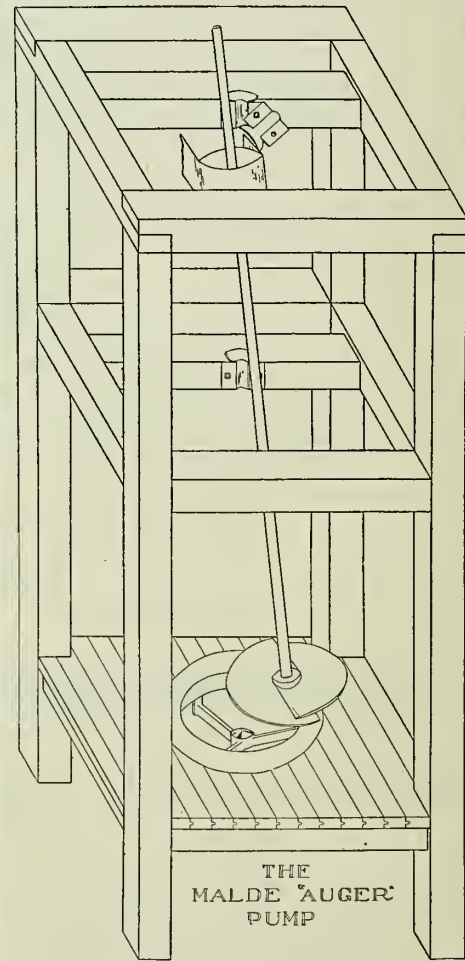
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at the same time do away with any objection that eastern apple buyers and fruit inspectors may have as to the material used being poisonous.

The fruit growers of America have requested the American Farm Bureau Federation to call a conference of their representatives to discuss ways and means of advancing their interests. President J. R. Howard has issued a call for such a meeting to be held in the Congress Hotel, Chicago, Illinois, on April 5. The Department of Cooperative Marketing will have the meeting in charge. Each State Farm Bureau Federation has been requested to send at least one official representative of the fruit growers of its state.

The Welch Grape Juice Company announces that it will build a grape juice factory at Springdale, Arkansas, to be ready for operation in 1922-23. The first investment in land and buildings will be about \$300,000. It is the intention of the company to build additional units as fast as the growth of the acreage in the Ozark grape belt warrants. Farmers in the vicinity of Springdale have pledged themselves to plant 1,500 acres of grapes this year in addition to the acreage which the grape juice company has purchased.

E. C. Crosby, who, with his son, lives on a 15-acre orchard, 15 miles southeast of Spokane, has prepared figures on the apple business which he thinks should be investigated. The Crosbys lost their 1919 apple crop because of late frost, but by smudging last spring they raised an enormous crop of the best quality and at the time of picking figured upon a net profit of \$4,000. Their apples were hand-sorted and carefully packed and in many of the boxes a card was placed asking the consumer to write the grower how much he paid for the box and in what condition the apples were found. Mr. Crosby says that from Pittsburgh, where he netted an average of 60 cents a box above freight charges, two consumers wrote that they paid \$7.25 and \$7.75 a box and that from Indianapolis, where his apples netted 65 cents, the consumer wrote that he paid \$10.25 for a box of extra fancy Jonathans. All reported the fruit in good condition. Mr. Crosby further states that receipts show that the railroad companies received \$3,600 for transporting his crop, but that in addition to receiving nothing for his labor, he will also be out all the money paid for help in raising and marketing the crop. He figured that each box cost him \$1.10 when put upon the market.

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When ordering BE SURE TO MENTION which of these you intend using it on, this is important. Write Seattle for pamphlet No. 10 of information.

Price: Garden size, 50c, Acre size, \$2.00; 5-acre size, \$8.00. Postpaid.

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Cannery Notes

Representatives of 40 canneries located in Oregon and Washington gathered at the annual session of the Northwest Cannery Association held in Portland during the latter part of February. According to the reports read before the meetings of the association the canning industry in the Northwest is in excellent condition as far as the sale of products for the

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season is concerned. Among those who addressed the convention were W. R. Scott, of Albany, Oregon, whose topic was, "Closer Co-operation of Cannerymen in the Willamette Valley," and C. J. Pugh of Falls City, Oregon, who discussed the child labor law. At a banquet held at the Multnomah Hotel, given by the American Can Company, the speakers were Paul W. Paver of Chicago, Preston McKinney, secretary of the Cannerymen's League of California, and Ernest D. Clark of Seattle. The election of officers resulted as follows: W. G. Allen of Salem, president; W. S. Pride of Bellingham, Washington, vice-president; C. D. Minton of Portland, Oregon, secretary-treasurer.

According to a recent statement of W. G. Allen of Hunt Brothers Packing Company of Salem, Oregon, more than 7,000,000 pounds of loganberries will be packed by Washington and Oregon plants during the present year. He also stated that of the loganberry pack of last year there is 30 per cent of the stock unsold in the two states and 27 per cent of the entire stock of all fruits still unsold February 20.

California canneries are reported to have put up 267,000 tons of fruit in 1920 making the total number of cases 11,382,863. The total vegetable pack was 5,249,946 cases.

It is announced that the California Central Berry Growers have decided this year to sell direct to the canner in order to eliminate the commission heretofore paid the jobber. The central California berry production in 1920 was: Strawberries, 84,000 chests; blackberries, 19,000 chests; raspberries, 9,000; loganberries, 8,500.

What They Are Doing in California

Extensive investigations on the question of arsenical spray residue in regard to the marketing of pears are planned by the Federal Bureau of Entomology in cooperation with the Pest Control Service of California State Department of Agriculture. The work will be done under the direction of A. J. Ackerman of the United States Department of Agriculture who will establish his headquarters at Sacramento.

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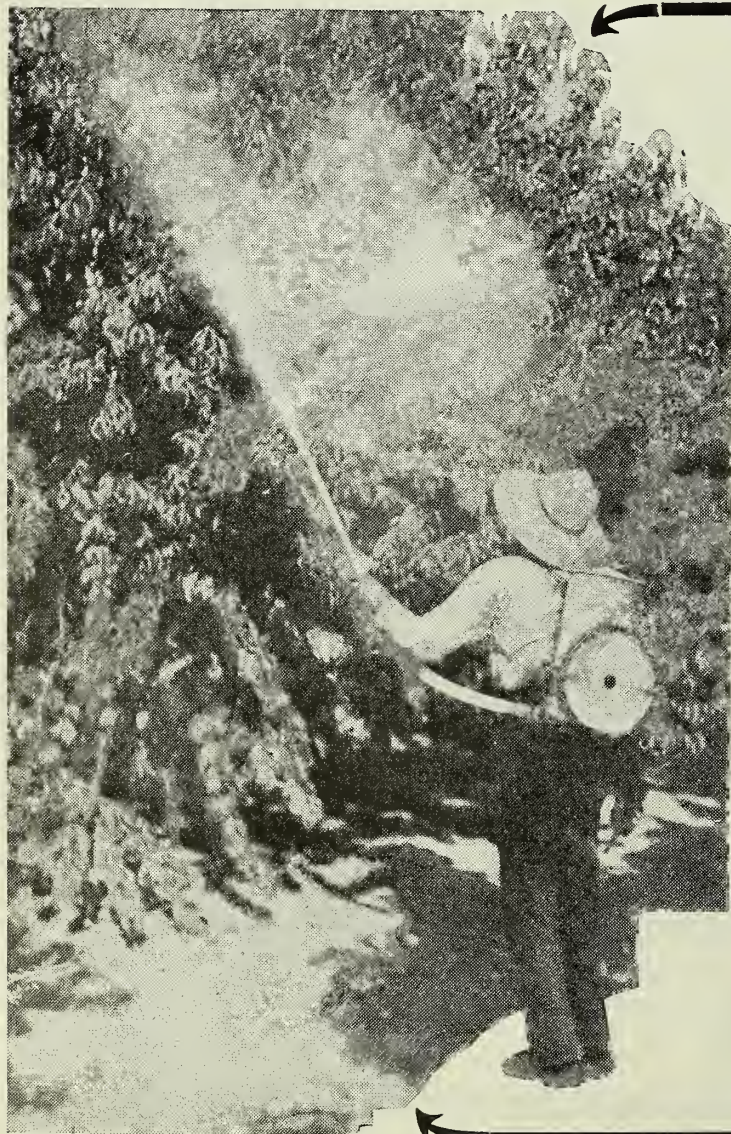
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One man will average 15 acres per day.

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Almond trees are reported to have commenced blossoming in some of the districts in California the first of February while deciduous fruit buds began swelling preparatory to blooming.

The California orange and lemon crop matured nicely in most sections. The crop of oranges is reported as unusually large although the size of the fruit is generally smaller than it was last year.

Walnut groves in Contra Costa and Santa Clara counties which will come into bearing this and next season it is expected will shift the supremacy of walnut production from Southern California to other sections of the state. The California Walnut Growers' Association reports its total pack for 1920 crop as 321,480 bags, of which 11,827 bags remained unsold February 1st.

Kings County fruit growers realized a total of \$7,355,653 for their 1920 fruit crop, an increase of more than a million dollars over 1919 figures of \$6,258,810, according to the annual report of the county horticultural commissioner. Grapes led with a total value of \$4,615,726, divided as follows: Raisins, \$2,813,100; shipped fresh, \$1,432,906; wine, \$369,720. Peaches, canned, dried and shipped fresh, yielded \$1,776,477; apricots, \$778,290; prunes, \$168,000; plums, \$17,160. The apricot crop was only about 60 per cent of that of 1919, and the prune and plum yield much lighter, grapes and peaches about equal, the increased return being due to the uniformly higher prices received for all fruits.

Railroads operating in California have shortened by two days the running time of fruit trains between the coast and eastern markets. The change was inaugurated at the request of a committee appointed by Director of Agriculture Hecke at the Fresno convention of fruitmen in November.

Advices from the Horticultural Commissioner of Yolo County are to the effect that 500 additional acres of grapes will be planted in that county this season. Last season Yolo County planted 1,132 acres of table grapes and 1,532 acres of wine grapes.

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Fertilizer for Orchard and Bush Fruit

Continued from page 8.

assume various conditions under which the grower may be working.

First, there is the young orchard, not yet in bearing. As a rule such trees will not need fertilization of any kind. Generally, such trees are planted on new soils and clean cultivation practiced. Strawberries or other hoed crops are planted in between the trees. The fertilization and care given the inter-crop should be sufficient to keep a healthy tree growing vigorously. On the other hand, if the trees are receiving good care but do not respond, the writer recommends the use of a small amount of nitrate of soda ranging from one-half to one pound per tree.

The above will apply to apple, pear, cherry or peach. The use of nitrate is recommended as a supplement to good

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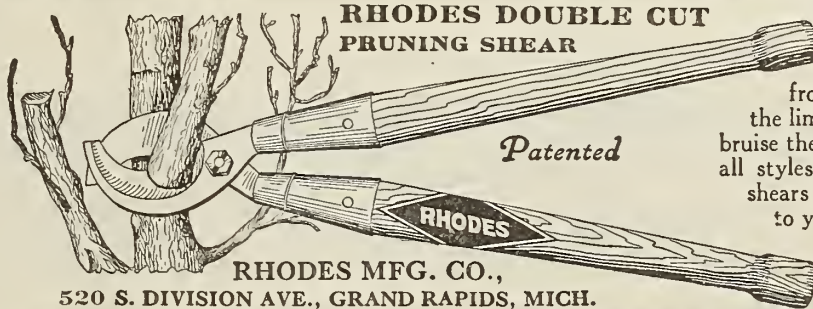
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irrigation and cultivation but not as a substitute. There are many young trees (re-plants) in the old orchard. Often these trees are badly neglected in that they are growing in sod and receive no clean cultivation. These conditions should be remedied and here again nitrate can often be used to advantage.

Trees just starting to bear must be handled with considerable care. Often they are making a very vigorous growth and heavy fertilization and pruning will retard the formation of spurs and production of fruit. If the trees are making a normal growth it is doubtful whether the use of nitrate will be advisable. On the other hand if trees are starting to bear heavily and growth is but moderate, the use of probably two pounds nitrate per tree will be advisable. Such trees as a rule have not yet been grow-

ing in the presence of a shade crop such as clover or alfalfa.

Then there is the older orchard. In most cases the grower has been using nitrate of soda for a number of years. The response from its use has been very satisfactory in that greater yields have been secured. Tree growth has been much more satisfactory. In the meantime, clover or alfalfa has been grown and turned under. Such a practice is sufficient to furnish enough nitrogen for several crops if followed by clean cultivation, assuming of course that the soil is average and has not been depleted of plant food by protracted clean cultivation or intercrops. On the poor sandy soil, more than one green crop must be turned under to build up a soil and provide sufficient humus.

It should be pointed out that two tons

of alfalfa are capable of furnishing approximately 200 pounds of nitrogen, an amount sufficient to grow a 500 box crop of apples in addition to taking care of tree growth. In most orchards alfalfa does fairly well. That a great deal of nitrogen, not formerly fixed in the soil is now being secured from such a source is quite evident. Trees growing under such conditions make a normal growth and produce well.

Experiments with nitrate of soda were made with trees growing in the presence of alfalfa which had been seeded for several years. Neither the alfalfa nor the trees have ever been fertilized. The use of nitrate of soda under such conditions during the year when a heavy crop of apples was borne did not increase yields or improve the quality of

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the fruit which was excellent. Evidently the alfalfa was capable of furnishing sufficient nitrogen.

On the other hand there are orchards making scarcely a normal growth on which heavy crops are expected this year. The alfalfa may be pretty well "run out" being largely replaced by grassy sod. We know that such alfalfa is less capable of fixing nitrogen and that the grass takes a great deal of available nitrogen. Consequently the trees do not receive a normal supply for maximum production. Such orchards should be plowed or disked up and clean cultivation followed for one or two years, after which it may again be seeded to alfalfa, vetch, etc. In the meantime cultivation should be thorough and persistent not only to liberate plant food but to free the land of weeds and grass.

Where orchards are being seeded to clover or alfalfa, especially for the first time, it appears well worth while to use a small amount of nitrate of soda. This is especially so in the case of clover. If this is not done the trees during the second season following seeding do not do well. This is a common observation at Hood River. During the period when a shade crop is being established it is advisable to use a small amount of nitrate which will supplement the supply of nitrogen when cultivation cannot be given and before that time when the shade crop may be expected to furnish this element.

Strawberry Fertilizers.

For strawberry growers the writer recommends the use of a complete fertilizer testing approximately as follows: Nitrogen, 6.5 per cent; phosphoric acid, 7 per cent; potash, 8 per cent. This is made up as follows: Nitrate of soda, 800 pounds; superphosphates, 800 pounds, beet char, 400.

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other 250 in late summer right after the topping season. When thus used the grower should secure a maximum production of firm berries.

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With the Poultry

Inquiries Answered — Contributions Solicited

CULLING A FLOCK OF HENS.

In a bulletin recently issued on culling a flock of hens Byron Alder, of the Utah experiment station, brings out the following salient points:

Hens which are expected to produce eggs at a profit must be housed in comfortable roomy quarters, must be fed a ration which supplies all that is necessary to manufacture the eggs, and above all, must have the ability to lay. In all breeds or strains of fowls there are individuals which are poor layers because of some inherent quality which prevents them from making the best use of the care and the feed they receive. It is this which robs many poultry raisers of part or all of their well-earned profit. The elimination of the non-producer from the laying flock is an essential part of good poultry management. Many flocks which are now producing at a loss would be made profitable by culling the poor layers. Because of the high price of all poultry feeds the necessity for a strict, rigid culling was never more important than now. More eggs will be obtained from a few good, vigorous, well-selected hens properly fed than from three or four times this number of ordinary hens over-crowded and poorly or under-fed.

The first essential for a good layer is a strong, vigorous, well-developed body. Any hen that shows a lack of vigor should be eliminated. This lack of vigor may be indicated by a long thin beak and head, (crow head) by dull eyes, pale swiveled comb, long toenails, and by the habit of spending much of the time during the day on the perches. This type of hen should be sent to market at any season of the year she is observed, whether she is three months or three years old.

Culling the Pullets—The flocks of pullets should be gone over carefully early in the fall and all those eliminated which show a lack of development, are thin and emaciated, or have an unthrifty, listless, inactive disposition. The ability of a pullet to lay is limited by the amount of feed she can consume; therefore she must be large through the body and must have a well-developed abdomen. The color pigment test cannot be applied on pullets before they begin to lay. All White Leghorn pullets and most pullets of the American breeds should have deep yellow shanks, beak, and skin until they have been laying several weeks.

Every flock of layers should be gone over thoroughly at least once each year and each bird handled and the culls eliminated. This can best be done in August or September for two reasons. First, it is easiest to pick out the poor or non-layers at this time and it will be several months before they will begin laying again. Second, part of the old hens should be disposed of to make room for the pullets.

PARASITES ON POULTRY.

At least nine different species of lice, several species of mites, and at least two species of fleas attack the hen, according to entomologists at the New York State College of Agriculture at Cornell University. Hens, geese, ducks, and in fact all kinds of domestic fowls, are likely to be infested. Waterfowl are popularly supposed to be free from such pests, though the experts say they are always infested. Some of these cause serious injury to the fowls, with a consequent loss of profit to their owners.

The bird lice that are found on poultry are known as permanent parasites; that is, they spend their entire lives on the bodies of the fowls. They have biting, not sucking, mouth parts and their feet have sharp claws which scrape the skin of the fowls in the constant movements of the lice over the fowls' bodies. The constant irritation caused by the presence of the lice it is stated, eventually weakens the fowls infested and renders them susceptible to such diseases as gapes, cholera, roup, and others.

Of mites there are at least eighteen species parasitic on poultry. Some of these are not permanent parasites, but attack the fowls

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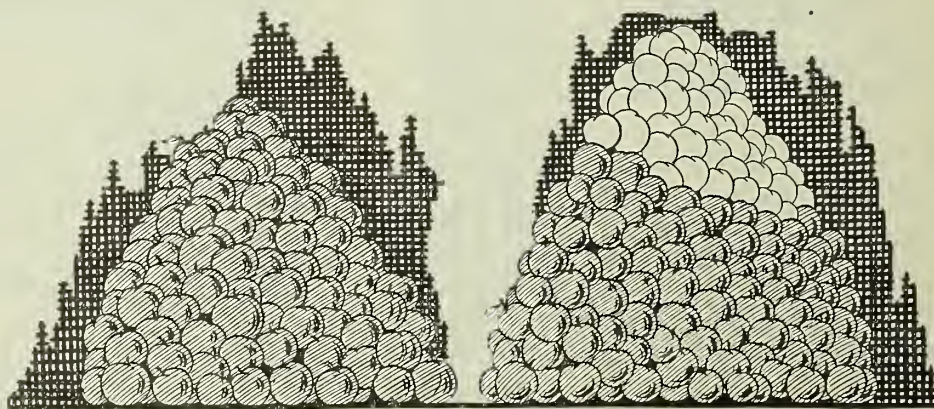
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only at night, hiding during the day in cracks about the poultry house. Some of the species of mites are blood-sucking; others cause affections of the skin. Under certain conditions they become exceedingly abundant, and great loss to the poultry owner results from their effect on the fowls.

Methods of Control—The most potent cause of the presence and increase of these parasites is filth. This statement is not only the result of common observation, but of experiments in control measures made by the college experts. Filth as here used includes decaying and decayed eggs, and bits of decayed matter of all kinds. The poultry house and the nests should be always kept clean, and there should be ample provision for light and air. Poultry parasites, like most other pests thrive much better and increase much more rapidly in dim than in well-lighted places. If a poultry house is already infested with mites and is too valuable to be burned down and rebuilt, it may be sprayed inside with kerosene or crude petroleum, which may be made into an emulsion if desired. Two, and sometimes three applications should be made.

HIGH PERCHES.

An authority on poultry says that if you have heavy birds do not let them jump too far from the perch to the ground or floor. If you have board floors or hard ground it is likely to bruise the foot so that the hens will have what is called "humble foot." Besides being unsightly, this is a real painful condition and hens cannot do their best which have it; so it pays to look after these little things that make for hen comfort. All in all, the hen whose comfort is looked after is the profitable hen, and that is what the average poultryman wants.

POULTRY NOTES.

One of the most essential things in securing vigorous chicks is care in selecting the hatching eggs whether they are to be placed under the hen or in the incubator. You should see to it that your hatching eggs come from your best fowls.

Nothing kills young chicks more quickly than to allow them to become chilled. Thousands of chicks die annually from this cause. Place the brooder where it will get plenty of sun and where the little fellows will have plenty of room to run about, yet be protected from the cold. Or if it is heated see that a proper amount of heat is evenly maintained.

You may feed your poultry well and still get few eggs. An examination of your poultry house may reveal one of the reasons. A tightly built warm poultry house is as essential to egg laying as is plenty of fresh air during the daytime.

The Oregon Agricultural College experiment station calls attention to the fact that hens fed for egg production should get feed containing the food elements found in the egg. An analysis of the egg shows that it is composed of ash 12.2 per cent; water 65.7 per cent; protein 11.4 per cent; and fat 8.9 per cent. The hen cannot counterfeit her product, so must be supplied with the necessary raw materials or she cannot manufacture the finished product.

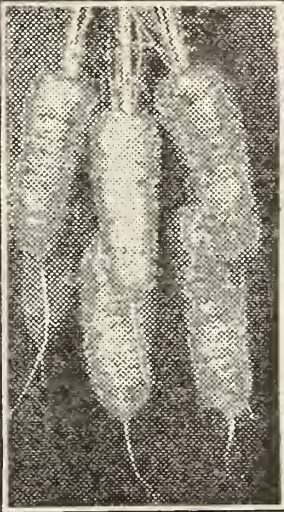
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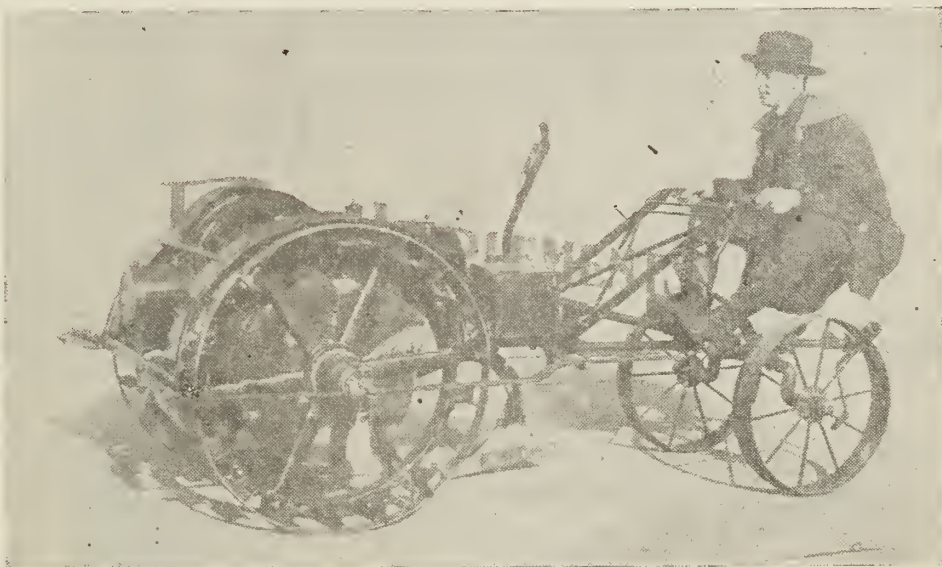
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Specifications

Horsepower: 12 at drawbar, 20 at belt pulley.
Length: 96 inches.
Width: 50 inches.
Height: 52 inches.
Weight: 3420 lbs.
Turning Circle: 12 ft.
Traction Surface: About 800 square inches.
Center to Center of Tracks: 38 inches.
Belt Pulley: Diameter, 8 inches; face, 6 inches.

Guarantee yourself a bigger crop and more profit — give yourself more time for other work by plowing and discing this spring with a Cletrac. Rugged and powerful enough for any kind of work—steady and dependable—the Cletrac cuts the cost and time of doing it. Its sturdy motor and strong parts keep it on the job straight through the year—and 24 hours a day if you get behind.

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